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10/761,613

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King Jien Chui

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09/19/2006

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EXAMINER

GARCIA, JOANNIE A

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|-----------------------------|--|
| Office Action Summary | Application No. 10/761,613 | Applicant(s) CHUI ET AL. | |
| | Examiner Joannie A. García | Art Unit 2823 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,7-27 and 38-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 38-40 and 43 is/are allowed.
- 6) ☒ Claim(s) 1,2,7,8,12-15,18-21,23-25 and 42 is/are rejected.
- 7) ☒ Claim(s) 4,9-11,16,17,22,26,27 and 41 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 2, 7, 8, and 14, are rejected under 35 U.S.C. 102(b) as being anticipated by Burr (US 2003/0178698 A1).

The rejection is maintained as stated in the Office Action mailed 04-05-06, and as stated below.

Burr discloses forming a gate structure 704 over a silicon substrate 706 being doped with a first conductivity type impurity such as p-type with a concentration of 1×10^{17} atom/cc (Figure 7A, and Paragraphs 0024, 0096, and 0161), forming a channel region under said gate structure with a concentration of 1×10^{17} atom/cc (Figure 7A, and Paragraph 0096), performing a doped depletion implantation region by implanting ions being a second conductivity type to the substrate to form at least a portion of doped depletion regions 770 directly beneath and separated from source/drain regions 703/705 (Figure 7A, and Paragraphs 0161, and 0164), wherein said doped depletion region is not formed under said gate structure and said doped depletion regions are fully depleted (Figure 7A), and performing a s/d implantation by implanting ions having the second conductivity type into the substrate to form the source/drain regions adjacent to said gate structure (Figure 7A, and Paragraph 0161), said doped depletion regions having an impurity concentration and thickness so that said doped depletion regions are depleted due to a built-in potential created between said doped depletion regions and said substrate (Figure 7A), and said doped depletion regions having a an impurity concentration so that the built-in-junction potential between said doped depletion regions and said substrate

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forms depletion regions in the substrate between the source and drain regions and the doped depletion regions, said depletion regions have a net impurity concentration of the first conductivity type (Figure 7A, and Paragraph 0161). In the process of Burr, it would be inherently to have depletions regions around any p-n junction, the depletion regions 770 of Burr being in the location recited in claim 1, for example (See <http://hyperphysics.phystr.gsu.edu/hbase/solids/pnjon.html#c3>).

Applicant argues that Burr does not teach at least a portion of the doped depletion regions are directly beneath and separated from said source and drain regions. However, and as disclosed above, Burr discloses at least a portion of the doped depletion regions 770 are directly beneath and separated from said source and drain regions 703/705, as shown in Figure 7A, and in Paragraphs 0161, and 0164.

Applicant argues that Burr does not teach a portion of perforated Buried N-well (N+) 770 directly beneath both the source and drain regions 703 and 705. However, the claims are not so limited. Furthermore, and as shown in Figure 7A, Burr discloses a portion of perforated Buried N-well (N+) 770 directly beneath the source and drain region 705.

Claims 12, 13, 15, 18-21, 23-25, and 42, are rejected under 35 U.S.C. 103(a) as being unpatentable over Burr as applied to claims 1, 2, 7, 8, and 14, above, and further in view of Bae et al (US 20040075143 A1).

The rejection is maintained as stated in the Office Action mailed 04-05-06, and as stated above.

Burr discloses performing either p-type or n-type processes (Paragraph 0200). Burr does not teach using boron as a p-type dopant, nor using arsenic or phosphorous as an n-type dopant. Bae et al discloses using boron as a p-type dopant, and arsenic or phosphorous as an n-type dopant. It would have been within the scope of ordinary skill in the art to combine the teachings of Burr and Bae et al, to form doped substrate 706 of Burr to be performed, by employing the either of the dopants disclosed by Bae et al. Burr discloses the claimed invention except for a channel width between 0.04 and 0.5 μm , a boron and a phosphorous or arsenic dose for the doped depletion implantation region between 5×10^{11} atoms/ cm^2 to 5×10^{13} atoms/ cm^2 , an energy for the doped depletion region between 50 keV to 500 keV, a depth below a substrate surface for the doped depletion implantation region of 0.09 μm to 0.7 μm , a boron and a phosphorous or arsenic dose for the s/d implant between 5×10^{14} atoms/ cm^2 to 5×10^{16} atoms/ cm^2 , an energy for the s/d implant between 50 keV to 80 keV, a depth below a substrate surface for the s/d implant of 0.04 μm to 0.5 μm . It would have been obvious to one having ordinary skill in the art at the time the invention was made to determine a suitable channel width, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In addition, the selection of a suitable channel width, dose, energy, and depth, is obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937

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(Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed channel widths, doses, energies, and depths, or any unexpected results arising therefrom. Where patentability it's said to be based upon particular chosen channel widths, doses, energies, and depths, or upon another variable recited in a claim, the Applicant must show that the chosen channel widths, doses, energies, and depths, are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claims 4, 9-11, 16, 17, 22, 26, 27, and 41, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 38-40, and 43, are allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joannie García whose telephone number is (571) 272-1861. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you

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have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



JAG

September 14, 2006

GFourson
Primary Examiner



George Fourson
Primary Examiner
Art Unit 2823